

Missouri. Conservationist

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Conservation Enriches Our Lives

On this particular morning in mid-February, the cold temperature and snow-covered ground proclaimed winter was going to be around for a few more weeks. I had taken a long hike on my

family's Moniteau County property in search of antler sheds. This outing was to exercise both the body and mind.

Standing in a timbered draw among mature white oak trees, the activities of nearby birds—white-breasted nuthatches, tufted titmouse and black-capped chickadees—captured my attention. I watched and listened as they communicated my presence throughout the valley. These animals seemed to recognize the importance of communicating to all.

Compared to past generations, surveys show Missourians' lifestyles both at work and home have evolved into fast-paced, technology-savvy and multi-tasked heavy workload settings. This fact combined with the growing size and diversity of our state's population heightens the importance of communicating the conservation message through a mix of traditional and new approaches.

During the past year, the Department has completed development of educational units that teach science requirements through focusing on specific conservation examples within our state. These educational units meet state testing standards and are available for elementary through high school students. A kindergarten through second-grade unit and a preschool unit are also in development and will be available in fall 2011 and 2012 respectively. Currently, more than 140 school districts are utilizing these classroom materials. Feedback from teachers and students has been positive. I encourage all teachers to explore use of these materials. Wouldn't it be great if all Missouri students could experience an educational unit on conservation to better ensure they understand the connections between conserving forests, fish and wildlife and the quality of their own lives?

As citizens continue to grow in their reliance on modern technology as a communication venue, the Department has



initiated some proactive steps. Technologies ranging from our interactive website to Facebook posts to specific conservation applications for smart phones have enhanced the Department's ability to communicate with unprecedented speed. From the more than 3.1 million unique Web visitors each year to the 26,000-plus Facebook fans, feedback has been encouraging. These communication venues allow

citizens easy access to the most up-to-date information including conservation messages, management assistance, information on specific conservation areas and daily posts on timely news. In addition, technology has allowed the Department to begin delivering key information directly to individuals, select stakeholder groups and the general public, versus requiring them to contact the Department.

Combined with traditional methods such as public meetings, surveys, news releases and radio spots, we will continue to develop and utilize new communication approaches in the future. It is tremendously important to ensure that all citizens, regardless of age or location within our state, have an opportunity to learn about and understand the importance of Missouri's forest, fish and wildlife resources.

As I completed my hike that day in February, the simplicity of nature had reinforced the importance of open communications.

A handwritten signature in black ink, reading "Robert L. Ziehmer".

Robert L. Ziehmer, director

OUR MISSION: *To protect and manage the fish, forest and wildlife resources of the state; to serve the public and facilitate their participation in resource management activities; and to provide opportunity for all citizens to use, enjoy and learn about fish, forest and wildlife resources.*



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GREAT GAME

I first started hunting in the late 1950s, carrying

my BB gun in a line of pheasant hunters. Ever since that time I have enjoyed the thrill of getting close enough to game to be able to take them. Even the other day, after shooting four green-heads, my dog and I stayed and continued calling ducks into our spread just for the fun of it. Over the years I have had the opportunity to hunt almost all of the different game, and it was always a thrill. At this time I take advantage of hunting turkey, doves, deer, and my favorite, the ducks. All of my hunting is done on conservation areas and public ground. I am thrilled that I live in a state with a great conservation department that

offers the average person a place to hunt without leasing or paying a day fee to hunt.

James (JB) Borisek, Springfield

As a lifelong Missouri resident, there are very few things that I am more proud to support through my tax dollars than the Missouri Department of Conservation. I remember when the 1/8 of 1 percent sales tax went into effect, and I can honestly say that I know of no other place where I feel like I've gotten as much direct benefit for my tax dollar than through the efforts of the MDC. My family and I regularly visit the Conservation Areas, shooting ranges and other public areas sponsored by the MDC.

I tell my 10-year-old grandson stories from when I started deer hunting in Missouri 40 years ago, and how my dad and I were lucky to even see a deer or two during deer season. With today's

thriving deer herd, that's hard for him to even imagine, especially since he's already taken two deer during Missouri youth seasons. Now he's so excited about the reintroduction of elk to Missouri that he can talk of little else. I can almost picture him telling an incredulous novice hunter someday that there once were no elk in Missouri! I just signed him up for e-mail updates on the elk reintroduction project, and we'll both be anxiously awaiting the news of how the program progresses.

Mike Lewis, Eureka

TRUMPETING PRAISE

I just wanted to drop a note of thanks for the spectacular cover photo of the February issue of the *Missouri Conservationist*. From the drip of water on the swan's beak to the drip of water on his tail, it is a masterpiece. We are all lucky to be able share in Danny Brown's artistry.

Virginia Emanuel, St. Louis



Reader Photo

POND LIFE

Bill Neaves, of Carrollton, captured this image of two western painted turtles on his homestead last March. "I saw the turtles on a log in the pond behind our home and went out in a canoe with my camera to see if I could get close enough to make a good photo of them," said Neaves. "They were so glad to be basking in the sun after spending the winter under ice that they allowed me to get quite close to them rather than dive into the still-frigid water." Neaves usually takes along his camera when he and his wife canoe on their pond to catch bass and bluegill, an activity they do several times a week from spring to autumn.

As a person who calls himself an artist, I spend more time than I probably should looking at the photos in your outstanding magazine. While there are always countless wonderful images to pore over, the cover photo of a trumpeter swan by Danny Brown sets a whole new standard. There are pictures and snapshots, but once in awhile we get to enjoy works of art created through the lens of a camera. I often wonder if the photographer got lucky, or really had the talent to put it all together to get a shot like this. My guess is that in the case of Mr. Brown, he is just that good.

Jim Swearngin, Des Moines, Iowa

THE SWEET LIFE

I wish to compliment authors Anna-Lisa Tucker and Shanna Raeker on their article *Reviving a Sweet Tradition* in the January issue of the *Conservationist*. It was well researched and presented. As a (small family) maple syrup producer here in upstate New York, I found the article interesting and informative, particularly the Native American and Missouri history of maple sugar production. Keep up the good work with articles of this sort describing the use of the land and forest resources in that region.

John Underwood, Salem, NY



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E-Permits Available March 1

As of March 1, you can buy most hunting and fishing permits at home, using the new e-Permits system. The system allows you to print permits on your computer printer and use them immediately. You will not need a color printer to print permits.

All sport fishing and hunting permits are available through e-Permits. So are trapping permits and the Apprentice Hunter Authorization. They still look like permits and are about the same size as in the past. Commercial permits and lifetime permits are available from MDC's Central Office, 573-751-4115.

The change to e-Permits is part of MDC's continuing effort to improve services and keep permit costs low in spite of declining revenues.

Hunters and anglers now can buy permits online 24/7, anywhere they have access to a computer and printer. If they prefer to buy permits from vendors, as they always have, that option remains open to them. They also can buy permits by calling toll-free 1-800-392-4115.

Vendors will continue to print permits on existing material until July 2012. Vendors will continue to use the old, Point-of-Sale permit system until July 2012, when they will have the option of moving to the new all-online system. Existing permits will be phased out between July 2012 and July 2013. After that, permits purchased from vendors will be on regular printer paper.

Missourians have been able to buy permits online since 2002. However, under the old online

system, buyers received only confirmation at the time of purchase. They used this confirmation while waiting to receive the actual permits through the mail, which could take up to two weeks. This was no help to turkey and deer hunters, who need actual permits to tag game. With e-Permits, turkey and deer hunters can buy permits, print them and use them immediately.

Deer and turkey tagging procedures have changed with the change to e-Permits. The main difference is that permits no longer include a removable transportation tag. Instead, the permit itself is the transportation tag. Deer and turkey permits have months printed along one edge and dates on another edge. Hunters will notch the month and day as part of recording their harvested game and attach the permit to the animal. They will continue to check harvested animals through the Telecheck system.

E-Permits are not printed on adhesive-backed material, so hunters will need to provide a means of attaching them to harvested game. Hunters are encouraged to put e-Permits inside zipper-type sandwich bags and attach them to deer or turkeys with string, twist-ties, wire, plastic cable ties or tape. Protecting paper permits in this way will keep them readable and make it easier to write confirmation numbers on them when Telechecking deer and turkeys. You also can print extra copies of permits in case one gets lost or ruined. As always, permits may not be shared and additional copies of a permit DO NOT provide additional valid permits for the buyer or others to use.

The change to e-Permits will reduce costs as MDC phases out software, hardware and special permit material used in the old, Point-of-Sale permit system. When fully implemented, e-Permits will reduce the cost of issuing permits by approximately \$500,000 annually.

Low permit cost is one reason the Show-Me State is a great place to hunt and fish. Missouri residents pay \$12 for an annual fishing permit, while residents in the eight neighboring states pay an average of \$20.80 for the same privileges. Missouri's \$17 Resident Any-Deer Permit is a fantastic bargain compared to the average of \$46.63 for equivalent privileges in surrounding states. More information about e-Permits is available at www.mdc.mo.gov/node/10900.

Missouri-Bound Elk Get Checkup

Elk that will form the nucleus of Missouri's restored elk herd are in a holding pen in Bell County, Ky., undergoing veterinary testing and treatment. This year's trapping effort netted a good mix of cows and young bulls. Nearly all of the mature cows captured this year are expected to be pregnant. State and federal officials conducted the first round of veterinary testing in January. The elk received injections to

kill internal and external parasites. Veterinarians administered a tuberculosis skin test and drew blood for other disease testing. The elk got ear tags and microchip identification tags. After a three-month quarantine period, the elk will be brought to a holding pen at Peck Ranch Conservation Area. They will get GPS collars when they arrive in Missouri so the MDC can monitor their movements. Spending time in the pen at Peck Ranch will give the elk time to get used to

their new surroundings before they are released into the 346-square-mile elk restoration zone in parts of Shannon, Carter and Reynolds counties. To read regular updates on elk restoration, visit www.mdc.mo.gov/node/11350.

April is No M0re Trash Bash

April is No M0re Trash month, and the Conservation and Transportation departments are using the event to encourage people to clean up roadsides,



ASK THE OMBUDSMAN

Q: Is it best to clean out bird nest boxes that were used last year or leave the old material there so that the birds don't have to replace it?

A: Early March is a good time to clean and repair your nest boxes for the coming nesting season. Cleaning out and disposing of the old nesting material is recommended. It can be a source of parasites or disease that could kill this year's hatch of chicks. Also clean debris from any drain or ventilation holes in the box that have become clogged. As an added precaution, you can spray the inside and outside of the cleaned nest box with a 10 percent solution of bleach in water to kill any lingering pests or disease.

Q: Why are paddlefish the only Missouri game fish that can be taken by snagging?

A: Snagging is not considered a sporting method for taking game fish that can be taken by pole and line or other methods using artificial or live bait. Paddlefish are not normally susceptible to catching with live or artificial bait. Instead, they feed on microscopic plants and animals in the water by swimming with their mouths wide open, similar to the way that whales filter plankton from ocean waters. They can feed without the use of eyesight or smell and utilize a rich resource that is unavailable to other native fish. In early spring, paddlefish swim upstream and may congregate near dams on some of our larger rivers. There are also significant runs up the major tributaries of some

reservoirs. The spring paddlefish season runs from March 15 through April 30, except on the Mississippi River where the two-part season is March 15 through May 15 and September 15 through December 15. For complete regulations, see: www.mdc.mo.gov/node/11414.



Eastern bluebird

Ombudsman Tim Smith will respond to your questions, suggestions or complaints concerning Department of Conservation programs. Write him at PO Box 180, Jefferson City, MO 65102-0180, call him at 573-522-4115, ext. 3848, or e-mail him at Ombudsman@mdc.mo.gov.

parks, rivers and streams. It isn't just about picking up litter, but also about hosting events to teach how to prevent litter from happening in the first place. More than 12,000 volunteers removed more than 128,000 bags of trash and many more truckloads of debris from public areas last April. With your help, we can do even more this year. Anyone can hold a No More Trash Bash event and get a

free lapel pin for their efforts. Besides recognition, volunteers get exercise, fresh air and cleaner places to work, live and play. For more information or to report your trash-busting accomplishments, visit www.nomoretrash.org.

CRP Sign-Ups March 14–April 15

Over the past 25 years, the federal Conservation



CRP is one program landowners use to help them improve their land for wildlife.

Trout Action Heats Up in March

Cold-loving brown and rainbow trout are biting right now in dozens of places around Missouri. Trout fishing begins March 1 at Missouri's four trout parks. MDC stocks trout in ponds for winter fishing at lakes in St. Charles, St. Louis and Jackson counties, St. Louis City, Ballwin, Ferguson, Jennings, Kirkwood, Overland, Kansas City, Liberty, Springfield, Columbia, Jefferson City, St. Joseph, Jackson, Kirksville, Mexico and Sedalia. Want a wilder trout adventure? Try one of Missouri's 17 red-, white- and blue-ribbon trout streams or Lake Taneycomo, home of the state-record brown trout (28 pounds, 12 ounces!). For more information, see pages 16 through 20 of the *2011 Summary of Fishing Regulations*, available at permit vendors statewide or at www.mdc.mo.gov/node/3104.



Trout fishing begins March 1 at Missouri's four trout parks.

Reserve Program (CRP) has created millions of acres of upland and wetland wildlife habitat by taking highly erodible farmland temporarily out of production. From March 14 through April 15, landowners will have a chance to enroll land in CRP, benefitting quail, pheasants, ducks, deer, turkeys and a wide array of nongame wildlife. This includes cropland that is currently not in CRP, as well as existing CRP contracts that expire September 30, 2011. CRP rental rates have improved, giving landowners an extra incentive to enroll acreage. Check with your USDA Farm Service Agency (FSA) Office to learn the new soil rental rate.

In addition, FSA offices accept applications for some high priority practices anytime through their Continuous Conservation Reserve Program. Landowners can enroll field borders and areas around sensitive streams and ponds in practices such as CP21 Filter Strip, CP22 Riparian Forest Buffer and CP33 Habitat Buffer for Upland Birds. You still receive annual payments for enrolling field edges in these practices. The payments actually can be higher, thanks to sign-up incentives. In some cases, you also can receive up to a 90-percent cost share to establish approved vegetation.

A study by the MU Food and Agricultural Policy Research Institute showed that farmers came out ahead when they enrolled cropland edges into Continuous CRP practices such as CP33. For a complete report visit: www.fapri.missouri.edu.

Other USDA programs, administered by NRCS, such as the Wildlife Habitat Incentive Program and the Environmental Quality Incentive Program help landowners develop better grazing systems and wildlife habitat. In Missouri, these programs provide funds for installing conservation practices. Contact your NRCS Office for more information.

Waterfowlers Invited to Workshops

This year, the Department will consider duck season dates for the next five years. Zone boundaries for the 2011 through 2015 hunting seasons also will be set this year. First, however, we want to hear from duck hunters at the following Duck Season Dates and Zone Boundaries Workshops. The workshops will be held from 7 to 9 p.m. Details are available by calling the number listed for each workshop.

- **Columbia, March 7** at the Boone Electric Cooperative, 1413 Rangeline Street, 573-882-8388;
- **St Charles, March 10** at Stegton Regency Banquet Center, 1450 Wall Street, 636-441-4554 (preregistration required);
- **St Joseph, March 14** at MDC Northwest Regional Office, 701 James McCarthy Drive, 816-271-3100;
- **Blue Springs, March 15** at Burr Oak Woods Conservation Nature Center, 1401 NW Park Road, 816-655-6250;
- **Jackson, March 22** at Knights of Columbus Hall, 3305 N High (also known as Hwy 61 between Jackson and Fruitland), 573-290-5730;
- **Dexter, March 23** at the National Guard Armory, Hwy 114 East near airport, 573-290-5730;
- **Kennett, March 24** at the Justice Center, corner of the North Bypass (also called Ely) and Floyd, 573-290-5730;
- **Joplin, March 28** at the Wildcat Glade Conservation Area and Audubon Center, 201 W Riviera Drive, 417-895-6880;
- **Springfield, March 29** at the Springfield Conservation Nature Center, 4600 S Chrisman, 417-895-6880;
- **Nevada, March 30** at the Vernon County/Nevada Community Center, 200 N Ash Street, 417-876-5226;
- **Clinton, March 31** at the Clinton Christian Church, 1201 East Ohio Street, 660-885-6981;
- **Mound City, April 4** at Squaw Creek National Wildlife Refuge headquarters, 5 miles south of Mound City, just off Interstate 29. Take exit 79 and drive 3 miles west on Hwy 159, 816-271-3100;
- **Chillicothe, April 5** at Grand River Inn, 606 West Business 36, 816-271-3100;
- **Kirksville, April 6** at the MDC Northeast Regional Office, 3500 S Baltimore, 660-785-2420;
- **Hannibal, April 7** at the Knights of Columbus Hall, 1 Columbus Road, 573-248-2530.



Did You Know?

We work with communities to sustain healthy trees and forests.

Community Tree Care

- » More than **40** Missouri communities were given cost-share assistance last year for tree planting and maintenance through the Tree Resource Improvement and Maintenance (TRIM) program.
- » **\$299,000** was spent by the Conservation Department funding TRIM grants last year that leveraged \$344,132 in local matching funds.
- » **77** Missouri municipalities were recognized as Tree City USA communities last year. This program is run in partnership with the Arbor Day Foundation.
- » More than **42** percent of Missouri's population lives in a Tree City USA community.
- » **Four standards** must be met in order for a community to be certified as a Tree City USA. Those four standards are:
 - 1)** Have a tree board or forestry department.
 - 2)** Adopt an ordinance which outlines how trees on public property will be managed.
 - 3)** Spend a minimum of \$2 per capita on tree management.
 - 4)** Celebrate Arbor Day.
- » **11** utility providers were recognized as TreeLine USA companies last year—a program run in partnership by the Conservation Department and the Arbor Day Foundation.
- » The Missouri Arbor Award of Excellence program is jointly sponsored by the Conservation Department and the Missouri Community Forestry Council. The awards recognize those throughout the state that act as good stewards of their tree resources. Last year we recognized five entities including two communities, an individual, a business and an organization. In addition, two Citations of Merit were presented.
- » To learn more about the Conservation Department's community forestry programs, visit www.mdc.mo.gov/node/8695.



NOPPADOL PHOTHOONG

Update: Mountain Lions in Missouri

In late November a Platte County resident photographed a mountain lion in a tree; then in early January a mountain lion was killed in Ray County by a raccoon hunter. On January 19, MDC staff confirmed a trail camera photo of a mountain lion in West St. Louis County; on January 22 a mountain lion was killed by hunters in Macon County; then on February 16 MDC staff confirmed a trail camera photo of a mountain lion in southern Linn County. These five recent events have opened the floodgates of public inquiry and have Missourians wondering about the true population status of these large cats, why the recent increase in occurrences and how the *Wildlife Code* addresses mountain lions.

Missouri's *Wildlife Code* has always offered mountain lions protection from indiscriminate killing. In 2006, with citizen input, the Department changed the code language to allow citizens a level of assurance that a mountain lion could be killed if it posed a threat to human safety. Additionally the Department has never considered nor has plans to reestablish mountain lions in the state.

Both of the recent mountain lion killings were thoroughly investigated by conservation agents and, based on the details of their findings, it was determined that a reasonable level of threat was demonstrated and charges were not warranted in either case. In a 1994 case, when a mountain lion was shot with no justifiable reason, the hunters were prosecuted and fined. Each situation must be investigated and reviewed on a case-by-case basis and evaluated on its own merit. The Department does not condone the indiscriminate shooting of mountain lions. However, we do acknowledge that landowners, and the public at large, must be afforded the right to protect themselves and their property/livestock under certain circumstances.

Missouri's mountain lion population was extirpated by the early 1900s as a result of unrestricted harvest, enormous habitat changes and increased human presence across the state. Our first confirmed reappearance of a mountain lion took place in 1994 and since that time, including the five most recent events, our total number of confirmed mountain lions in Missouri stands at 15. These low confirmation numbers are in no way indicative of a population, but they do demonstrate that mountain lions occasionally show up in the state.

Exactly where these individual cats are coming from can be hard to determine. Although we do know that mountain

lion populations in other states such as Texas, Colorado and South Dakota are growing and young males are dispersing. The most compelling and supportive evidence of this dispersal is demonstrated in the neighboring state of Nebraska. Recent confirmed sightings in Nebraska have increased from five in 2004 to more than 30 in 2010. Most of these sightings are near a small but verified breeding population in the northwest part of Nebraska. However, a dozen of those sightings are in the central and eastern part of that state. This is strong evidence that young male mountain lions may be dispersing into Missouri from sources such as Nebraska or South Dakota, and it is almost certain that others will continue to find their way to our state.

The Department responds to reports of mountain lions and investigates sightings that have evidence such as photographs, video, tracks, etc., in an attempt to record the presence of these cats in Missouri. We share the results of these investigations with the public through our news releases, website and other media formats.

The Conservation Department must constantly evaluate current policies and laws. We must continue to learn and educate others about relevant conservation issues and the mountain lion is no exception. We will continue to monitor the occurrences of these big cats in our state and evaluate our current positions, policies and regulations in a manner that benefits both the resource and all citizens of this state. ▲

For more information about mountain lions, visit our website at www.mdc.mo.gov/node/3505.

IF YOU ENCOUNTER A MOUNTAIN LION

The chance of encountering a mountain lion in Missouri is very, very small—almost non-existent. People, pets and livestock are at much greater risk from automobiles, stray dogs and lightning strikes than they are from mountain lions. However, if you do encounter a mountain lion in the wild, follow these safety tips.

- » **STOP.** Back away slowly if you can do so safely. Running may stimulate a lion's instinct to chase and attack. Face the lion, stand upright and maintain eye contact.
- » **DO NOT APPROACH A MOUNTAIN LION**, especially one that is feeding. Most mountain lions will try to avoid a confrontation. Give them a way to escape.
- » **STAY CALM.** Talk to it in a calm yet firm voice.
- » **DO ALL YOU CAN TO APPEAR LARGER.** Raise your arms. Open your jacket if you're wearing one. If you have small children with you, protect them by picking them up so they won't panic and run.
- » If the lion behaves aggressively, **THROW STONES, BRANCHES OR WHATEVER YOU CAN GET YOUR HANDS ON** without crouching down or turning your back. Wave your arms slowly and speak firmly. You want to convince the lion that you are not prey and that you may, in fact, be a danger to it.
- » **FIGHT BACK** if a lion attacks. Mountain lions have been driven away by prey that fights back. People have fought back successfully with rocks, sticks, caps or jackets, garden tools and bare hands. Remain standing or try to get back up.





The MOSAIC of an OZARK FOREST

The large-scale, long-term
Missouri Ozark Forest Ecosystem Project
aims to evaluate forest management
practices and their effect on flora and fauna.

by PAUL HAGEY

“THREE HUNDRED NINETY-FIVE FEET SOUTH,” says Susan Farrington as she glances at her GPS device and hikes downhill through a 13-year-old clear-cut portion of southeast Missouri Ozark forest. She pushes away brown, dying blackberry bushes and grapevines and passes under thin, regenerating 20- to 30-foot-tall oak and hickory trees. “You should’ve seen this area a few years ago,” she says over her shoulder.

Back then a dense tangle of vegetation made traveling difficult, but now it’s shriveling away as the developing forest canopy shades out the early succession plants, revealing a familiar forest-floor assemblage. Farrington glides through the developing saplings’ trunks and over scattered woodland detritus and thin soil to reach the goal: a 1-square-meter ground flora study plot marked by stakes abutting a black hickory tree.

This square-meter plot, or quadrat, is one of the 16 quadrats at vegetation plot 70 on site 3 of the Missouri Ozark Forest Ecosystem Project, known as MOFEP. It helped Farrington to determine that clear-cuts may actually be good for ground flora diversity, at least in the short term. With abundant light reaching the ground after a clear-cut, open woodland plants reemerge.

Overstory research crew member Chad Doolen measures trees in Site 71, a control plot for the MOFEP study.

During the summer of 2009, Farrington, a Missouri Department of Conservation resource scientist, led a crew that catalogued more than 500 species of plants in the 16 quadrats associated with each of the 648 vegetation plots scattered throughout the project's 9,200-acre study area. MOFEP crews also inventoried trees, mammals, hard and soft mast (acorns, seeds, nuts, berries, fruit), birds, insects, amphibians and reptiles, carbon flux and more. Someone, if the project persists, will kneel to inventory the plants at the same quadrat of site 3's plot 70, along with all the other plots' quadrats, 80 years from now.

MOFEP asks two simple, yet ambitious questions: What effect do different timber harvesting techniques have on elements of a forest ecosystem at a landscape scale? And how do forest ecosystems change?

CREATING THE EXPERIMENT

The project has a roundabout beginning. Twenty years ago (1989) at an MDC meeting on brown-headed cowbird parasitism of Neotropical migrant birds' nests in Ozark forests, the question arose: Do clear-cut harvests in extensive, mature forests, like those found in the Ozarks, increase cowbird parasitism? (Cowbirds lay their eggs in other birds' nests, forcing the foster parents to raise them at the expense of their own young, hence "parasitism.") Steve Sheriff, a biometrician with MDC who helped design the MOFEP experiment, remembers the group had a quick "Aha!" moment. They decided to conduct a traditional experiment to determine, beyond mere correlation, just what effect forest fragmentation had on cowbird parasitism.

"Everybody sat there kind of stunned," remembers Sheriff, and for good reason. An experiment is much more complicated than a study, yet it offers well-built, stronger insights. As the group warmed to it, ideas flew out, and it was decided that the experiment should include amphibians, reptiles, deer, turkey, butterflies and soft mast production. In a snap, the Neotropical songbird spark had roared into an ecosystem-wide fire. Over the next year, the group developed the study's focus and found suitable MDC land in Carter, Reynolds and Shannon counties to host the project.



NOPPADOL PAOTHONG

THE SETTING

Nine sites of about 1,000 acres each, in close proximity to one another, were chosen for the experiment. Each site was mostly forested, with minimal edge or disturbance, and mostly free from any harvest or other management activities for at least 40 years. The nine sites are grouped into three blocks, and within each block, one site receives even-aged forest management, another receives uneven-aged forest management and the third is no-harvest forest management. Even-aged forest management uses clearcutting, which removes an entire stand of trees, to regenerate the forest. Uneven-aged forest management removes single scattered trees or small groups of trees



Common yellowthroat



the largest summary of Ozark forest conditions ever assembled.”

BIG DESIGN, BIG CHALLENGES

With its broad design, MOFEP operates with the understanding that overall complexity, founded on biological diversity, leads to sustainability. To really understand the effects of a particular timber harvest method on even just one bird species, the effects have to be understood, as well, on the trees the bird lives in, on the insects the bird eats, the plants those insects eat, the soil those plants thrive in, the bacteria and microorganisms that maintain that soil, and the landscape in which all of this is nestled.

The MOFEP experiment, therefore, seeks to integrate multiple aspects of an Ozark forest ecosystem, including biotic (living) and abiotic (nonliving) components, in as many as 30 independent studies that are integrated together in one research design. MOFEP focuses on these pieces from a landscape perspective; changes will be analyzed as they occur throughout a 1,000-acre site, not just where a harvest occurs. By measuring site-wide data for each harvest treatment and then comparing it with the data from the no-harvest sites, researchers can deduce the effects timber harvests have on the forest ecosystem and its parts.

MOFEP seeks to answer the question of how timber harvest, shown above, affects whole forest communities and birds, such as the common yellowthroated warbler to the left, and other animals that live in them.

to regenerate the forest and no-harvest forest management serves as a control for the experiment. Because timber forests in the Ozarks are managed in 100-year cycles, or rotations, roughly the lifespan of many of the species in current oak-hickory forests, MOFEP is designed to continue for at least 100 years, but there’s hope that it will extend to 200 or 300.

For several years before the first round of harvests in 1996, MOFEP researchers collected voluminous baseline site data that ranged from soil type to landscape structure to ecological history to flora and fauna composition, all to be used as a background with which to compare the post-harvest data. As one MOFEP researcher wrote, the pre-treatment study “is

Botany crew member Dustin Cramer takes data measurements in a control plot site. Data from MOFEP show that even without timber harvests, Ozark forests are changing.

Each block of three sites makes up its own experimental unit and thus presents an opportunity for comparing each of the three units' individual results. The experiment is set up as an adaptive one, as insights emerge through the life of the experiment, resource managers can adjust management practices and methods can change, such as harvest frequency, survey methods or even research focus.

MOFEP places a magnifying glass over this generation's use of the forest, which also reflects that of the last generation. Data from MOFEP show that even without timber harvests, Ozark forests are changing.

The MOFEP sites, like most of the Missouri Ozarks, are second-growth forests, a repercussion of the area's turn-of-the-20th-century vast timber harvests, in which first shortleaf

pine, and then oaks and hickories, were heavily cut. Because the forest essentially re-sprouted from this early 20th-century clear-cut, most of MOFEP's mature trees were 60 to 80 years old at the project's inception in 1989. Faster-growing red oak group species like black oak and scarlet oak (24 and 21 percent of all trees on MOFEP land, respectively) now dominate the forest, and, in accordance with typical 100-year lifespans of the red oak group, are nearing maturity. Among younger trees, however, white oak trees dominate the forest (currently 21 percent of all trees in MOFEP). White oak trees number nearly twice that of black and scarlet oak, because they grow better in shade.

The disappearance of trees in the red oak group could affect wildlife as well as timber. Although red oaks flower every year, it takes



two years for their acorns to mature, while white oaks produce mature acorns from their flowers yearly. Given the area's susceptibility to late frosts that kill or decimate an oak's flowers and thus its acorn production, this difference in acorn maturity helps to ensure a yearly acorn crop.

MDC resource scientist Randy Jensen has been a part of MOFEP since fieldwork began on the project in 1990. In the years before and after harvests, the trees in all 648 of MOFEP's half-acre vegetation plots are catalogued. On these plots, Jensen has overseen the assembling of a database that now encompasses 96,000 individuals of 50 tree species.

Predominantly former pine and white oak open woodland, MOFEP areas now contain more densely stocked oaks (72 percent) and hickories (19 percent). In part because of a lack of regular disturbance like fire (which used to be much more frequent), shortleaf pines now make up only 9 percent of MOFEP's trees, an estimated 30 percent of their pre-1900 numbers. All other tree species in MOFEP's inventory combined make up less than 1 percent.

Jensen oversees research of MOFEP's overstory. His crew inventories trees, their species, their crown status, their diameter and their wildlife cavities. They also note if the trees are alive, snags (standing dead trees) or lying in the soil, decomposing. On vegetation plot 71 on site 6, just southwest of Ellington, his seven-member crew catalogued the half-acre's trees early in the fall of 2009. The site is lush, a broad upland waterway that opens from the north side of a hill, gently slopes for 100 yards or so, then crosses a dirt road and drains into Paint Rock creek, which, in about a mile, meets the Current River below Paint Rock Bluff.

The crew finds the plot's stake-marked center, measures 82.8 feet north to the plot boundary and then moves clockwise, inventorying every tree with a trunk above a 4.5-inch diameter (smaller-diameter trees are measured in a plot's subplots and quadrats). Several crew members identify trees while the crew leader corroborates and enters information in a PDA-like device that updates a vast tree database. Each catalogued tree has an ID tag nailed to its base, corresponding to its database ID. Thus, life histories of single trees play out every three to four



Susan Farrington takes botany data measurements in one of MOFEP's control plots. To really understand the effects of a particular timber harvest method on even just one bird species, the effects have to be understood on multiple aspects of an Ozark forest ecosystem.

years in Jensen's ever-growing database.

This opportunity to watch the forest change provided the most surprising insight of Jensen's MOFEP experience so far—the forest is dynamic. Often it changes, he says, tree by tree, in ways he wouldn't have expected. Sometimes he's surprised by which trees grow a lot, which not at all, and which die or fall down. Consequently, once assimilated with research from the other 30 studies, the promise of powerful insights in MOFEP appears true.

However, this integration represents the great challenge of the project. As yet, no one has figured out how to synthesize the varied, intricate, simultaneously inventoried forest components into a single, meaningful ecosystem model. No doubt the task is daunting, and a little premature just 20 years into a 100-year study.

But the questioning goes on: How do timber harvests affect whole forest communities, from the Acadian flycatcher that spends its northern life feeding on its insects and breeding in its trees, to the broad-headed skinks and central newts that live in its leaf litter, to the bacteria that live in its soil, to the tick trefoil and goat's rue that grow close to its ground, to the shortleaf pine seedlings, moth and butterfly larvae, the beetles, mites, millipedes, copperheads, acorns and berries, white-footed mice, chipmunks, sulphur, carbon itself, all which eat, are eaten, reproduce, live, die and otherwise interact in this Ozark forest life?

MOFEP is a good start. ▲



Just a Robin

One of North America's most successful birds, robins thrive in Missouri. These alert, energetic birds may be common, but they deserve a closer look.

IT WAS EARLY MAY, peak warbler migration time in Missouri, and I was keeping my binoculars close to my desk. Whenever I heard a bird call out of the ordinary, I left the computer and was out the back door of my house in Jefferson City, scanning the canopy of trees in my yard.

Yellow-rumped warblers were feasting on small insects at the top of an elm tree, but there was also some elusive movement lower in the tree. Too big for a warbler. Was it a veery? A hermit thrush? Then I saw its bright russet breast, white eye ring and yellow bill.

"Just a robin," I said out loud to no one. With those three words, I dismissed one of North America's most successful birds, simply because it was so common. I immediately trained my binoculars on other movement in the trees, hoping to see something more unusual. But I saw the robin flick its tail, as if indignant, and fly to another branch to perch. It was just a robin, one of several at the moment, not only perching in my trees but hopping across my yard, and one of an estimated 320 million individuals living at any given time in North America.

by CAROL DAVIT, photos by NOPPADOL PAOTHONG



From Pristine Forests to Parking Lot Islands

Like poison ivy, American robins can be found throughout Missouri; they live and nest in yards, woodlands and farms, but also parks in big cities and even strip mall parking lots.

Robins are the birds most all Missourians know by sight, the ones we absentmindedly watch out the window when we are talking on the phone: they do their run-bounce across lawns, then stop, cock their heads, scan for predators, yank a worm out of the ground, then run-bounce some more.

After a rain, we see them in puddles in parking lots as we wheel groceries to cars: there they are, splashing and flapping in temporary, asphalt birdbaths.

At dusk, when we are cleaning up after dinner and getting kids into bathtubs, robins often get overlooked, but they are out there, chasing each other around in our yards with erratic flight or singing as the day draws to a close.

Most all Missourians have heard robins as well, even if they don't know which birds are producing the sound. Unless you are living

in a high-rise in downtown Kansas City or St. Louis, you have no doubt awoken to the spring dawn chorus of birds—to us, the intense, wonderful sound of winter going away; to birds, a competitive madhouse of males trying to outdo each other, attract a mate and pass on genetic material to future generations.

In suburban and urban areas, the sweet racket is coming mostly from robins, cardinals, titmice, chickadees, house finches and wrens. In many rural areas, the dawn chorus may be laced with the more complicated calls of numerous warbler species, but often with the upbeat song of robins included in the mix.

Following Food

We don't think twice about robins being a part of Missouri's bird life, but in fact they were not always so common here as they are today. In spring and summer, robins eat lots of earthworms. Earthworms live in moist, soft soil they can move around in. Around the time of Missouri statehood, as settlers moved westward across the United States and established towns and agricultural areas, they converted millions

American robins were named by English settlers for the bird's resemblance to the European robin. American robins, however, are members of the thrush family while the European bird belongs to the Old World flycatcher family.



of acres of prairies, forests and other natural communities to cropland and pastures.

Since then, we have continued to convert natural landscapes into lawns, golf courses, parks and cemeteries, often accompanied by irrigation systems. All of these land use changes created millions of acres of short grass, soft soil and easy access to lots of earthworms and other soft invertebrates that robins eat. Thus, robins have come to thrive in Missouri, and they breed and winter in nearly every other state as well.

“Robins are found in a huge variety of habitats,” said Dr. Greg Butcher, director of Bird Conservation for the National Audubon Society, “and one of them happens to be suburbia.” Human development, including suburbia and farms, has not only produced a lot of good earthworm-foraging territory, but also, Dr. Butcher notes, more sources of fruits.

In the colder months, when soil hardens or freezes, robins switch from eating invertebrates to fruits. In fall, huge flocks of robins, some numbering in the thousands, migrate to lower elevations or southward in search of sources of fruit like chokecherries and berries of hawthorn, dogwood and sumac. Many robins live in Missouri year-round; those here in winter will wander from fruit source to fruit source. It seems that every winter I have seen snowy ground mottled with the bright orange remains of bittersweet berries, left in the wake of a hungry sweep of robins.

People have helped increase fruit supplies for robins in several ways. Directly, in the form of trees and shrubs planted for ornamental landscaping and to attract wildlife. These include native species but also the highly invasive and non-native shrub or bush honeysuckle, spread in part by robins and other birds ingesting the fruits and taking the seeds to new locales via their droppings. Indirectly, the suppression of fire across much of Missouri’s landscape has helped native eastern red cedar invade prairies, woodlands and glades. The tree’s blue “berries” (actually female cones) are readily eaten by robins and other birds.

Robins, Conservation and You

Populations of some birds, like the highly adaptable robin, have increased in response to



American Robin Facts

» **Scientific Name:** *Turdus migratorius*. *Turdus* is the Latin name for thrush. The species name is reflective of the migratory nature of robins, which travel in spring and fall to available food sources.

» **Size:** At an average of 10 inches from beak to tail, the American robin is the largest member of the thrush family regularly seen in Missouri.

» **Appearance:** Adult male and female coloration is the same (dark brown head, back and wings, russet breast, yellow beak) but females are generally paler, especially the head.

» **Survival and reproduction:** While a robin may nest three times in one year, only 40 percent of nests successfully produce young, and only 25 percent of fledged young survive to November. And, only about half of the robins alive in any year will make it to the next. The oldest robin known lived to almost 14 years of age, but the average 6-month-old robin only has another 1.7 years to live.

» **Food:** Earthworms and other invertebrates, including butterflies, moths, ants, spiders and beetles, especially in spring and summer. In fall and winter, robins spend more time in trees and shrubs eating fruits.

» **Breeding Season:** In Missouri, March to mid- to late August. Males assertively defend territory, flying at or even striking rival males chest to chest. Pairs generally stay together for the entire season.

» **Nest:** Made of mud, grass and twigs. Robins often incorporate worm castings into nests.

» **Eggs/Young:** Usually four eggs per brood. Robins will produce two to three broods each year.

» **Incubation and Fledging:** Females incubate eggs for approximately 12 to 14 days after laying the last egg. Fledglings usually leave the nest 14 to 16 days after hatching.

For more information on robins other common birds and birding in Missouri, visit MDC at www.mdc.mo.gov/node/235, the Cornell Lab of Ornithology at www.birds.cornell.edu, or Patuxent Wildlife Research Center at www.pwrc.usgs.gov. A wealth of information on birds and climate change is also available at www.birdsandclimate.org, maintained by the National Audubon Society.

One of the most sublime colors in nature, the distinctive pale blue-green hue of the robin's eggs is known as *robin's egg blue*.



One-day-old American robin chicks wait for their mother to return to their nest and feed them.

human changes to the landscape. Of course, other species have not fared well at all. Many species dependent on vast, treeless prairies, wetlands, or forests have declined or have been extirpated due to human-caused habitat loss or degradation. Robins are known as a *generalist species*, as they can survive in many habitats. Species like greater prairie-chickens or cerulean warblers, on the other hand, are *specialist species*, dependent on specific, high-quality habitats—and in the case of these two species, large tracts of prairie and intact forest, respectively.

But even robins aren't immune to all changes to the landscape. Because so many robins feed on earthworms and other invertebrates from lawns, they are vulnerable to chemicals like



lawn fertilizers and pesticides. And, climate change is likely having an effect on robins as well.

"Their wintering range has changed," said Dr. Greg Butcher, "and it could be attributable to increasingly warmer average temperatures." While the historic winter range of robins includes the lower half of the lower 48 states inland and parts of southern Canada along the coast, "We are seeing robins—and in increasing numbers—wintering in parts of Montana, Minnesota and even Alaska," said Butcher, "where 25 years ago, there were no



winter records of robins in these areas.” With northward movement in response to warming temperatures and increasing fruit supplies, a lot has changed for robins in just 25 years.

You can help robins and other birds by landscaping with native shrubs, vines and trees that provide fruits for the birds to eat in fall and winter. Get rid of shrub honeysuckle, whose seeds are spread by birds and which invades natural areas to the detriment of many other animals and plants. Avoid using lawn chemicals, which not only kill beneficial insects and degrade stormwater quality, but can also poi-

son robins and other birds that feed on invertebrates in lawns.

We humans crave novelty. Birders demonstrate this to great effect with bird checklists and the never-ending longing to see something new. But where would we be without common birds like robins living close to us, providing a wild streak to our daily lives? Robins represent the everyday elements of nature—like sunrises punctuated with bird song, nests discovered in corners of porches, and beautiful fragments of egg shell on the ground—that we often take for granted, and that we would crave if they were gone. ▲

The mother comes back with an abundance of earthworms for her now 2-day-old chicks.

STOP THE SPREAD!

Ornamental pears are invading!

by ANN KOENIG

How's this for a creepy sci-fi movie? Humans transport aliens to Earth without worry because we are sure they cannot reproduce here. Thirty years later a quiet, spectacled scientist discovers that the aliens are spreading. Indeed, alien offspring multiply and escape to our farms and parks, crowding our youngsters that are desperately trying to hang on ... you get the point.

Now, replace the word alien with ornamental pears and you'll see this is not sci-fi but a real-life dilemma. Ornamental pears are spreading in Missouri and causing quite a stir with landowners.

Ornamental pears were introduced to the United States in the early 1960s and came from China. All ornamental pears originate from *Pyrus calleryana*, or callery pear, commonly referred to as Bradford Pear. Bradford is indeed the oldest cultivar, or kind, of ornamental pear. Newer cultivars include Chanticleer, Aristocrat and Cleveland Select, to name a few.

Ornamental pears were originally very popular trees due to their prolific spring flowers, dark glossy leaves and ability to thrive in almost any kind of soil—and because people thought they were sterile and therefore had no messy fruits to contend with.

The first major downfall of ornamental pears came 15–20 years after the initial trees were planted. At that point, many unsuspecting homeowners found out that the branches and trunks of pears split in storms. Many reading this article can relate to waking up after a windy night to their prized yard tree ripped down the middle and lying across their driveway. Also, ornamental pears are more susceptible to a fungal disease called fire blight than was hoped when they were first introduced.

However, it has not been until the last few years that people have been noticing the ornamental pears we thought could not spread ... are. And, they are doing so quite prolifically. In fact, 26 states have reported wild call-





Wild callery pear trees can have a significant economic impact in that ridding them from pastures, disturbed areas, under power lines and in natural areas can be costly. They can have a sizable environmental impact as well, crowding out and shading our native plants.

DAVID STONNER



DAVID STONNER

Ornamental pears prefer full sun, so they will be found most often in open areas such as along roadsides and fields.

ery pears spreading in the past decade. How could this have happened?

There are two causes. One is due to the fact that ornamental pears have been overplanted in our communities. Although each different kind of callery pear cannot reproduce by itself, it turns out that when these many types of pear are all planted close together (like they are in our towns) they can cross-pollinate and produce fruits. The other method of ornamental pears reproducing is if the sprouts that sometimes grow from the base of pears are not pruned they can flower and crossbreed with the flowers of the tree itself. These small fruits are eaten by birds and are then scattered along fences and roadways, pastures, abandoned fields, natural areas and under power lines. Wild trees then sprout from these fruits and begin reproducing quite quickly. In fact, wild callery pear trees start produc-

ing flowers and spreading themselves after just three years.

Wrangling the Wild Callery

Some of the characteristics of wild callery pears are similar to the callery pears they originate from. They grow quickly, flower prolifically and will tolerate a wide variety of soils, character traits typical of an invasive weed. Moreover, some of the new wild trees are bringing back characteristics of the original trees from

China like very large, stout thorns, making a field filled with wild callery pears difficult to clear.

Wild callery pear trees can have a significant economic impact in that ridding them from pastures, disturbed areas, under power lines and in natural areas can be costly. They can have a sizable environmental

Americorps members remove invasive ornamental pears in Columbia.



DAVID STONNER

impact as well as crowding out and shading our native plants. These trees produce small fruits inedible to humans, not large juicy fruits like we think of at the store.

To pick out wild callery pears, look for their tight crowns and white flowers in the spring, especially along roadsides where trees have not been planted. Ornamental pears are one of the first trees to leaf out in the spring and retain their leaves until late into autumn. They do prefer full sun so will be found most often in open areas. Late in the fall, their red/purple leaves can be noticed in fields and disturbed areas. Once you key in on their characteristics, it's amazing how many wild callery pears you will spot.

One Missouri community has taken this issue by the thorns. In 2007, Columbia's Parks and Recreation Department was successful in obtaining a TRIM grant from the Missouri Department of Conservation to help fund a campaign aimed at informing the public about the invasive quality of ornamental pears. Coined STOP THE SPREAD! the city's program has been very successful. For instance, volunteers have been removing wild callery pears from the city's natural areas. A city park has been planted with 10 kinds of native, flowering trees to showcase what could be planted as alternatives to ornamental pears. You can visit their website at www.gocolumbiamo.com/ParksandRec/Parks_and_Facilities/stopthespread.php to view trees to plant as alternatives to ornamental pears—and to find brochures, articles, ads and more that the city created to help spread the word.

Brett O'Brien, natural resource supervisor with Columbia's Parks and Recreation Department, understands that people look to city parks and other public areas for examples of what trees to plant. He is working to reduce the number of ornamental pears in Columbia's park system and

Plant alternatives to the invasive ornamental pear:



American hornbeam



Downy serviceberry



Redbud

replace them with flowering trees that are not invasive and have lower maintenance needs than pears. In fact, working over a span of a few years park staff have reduced the number of pears in Columbia's downtown from 5 percent to 1 percent of the total tree population, illustrating that beautiful tree canopies in parks and downtowns can be accomplished without ornamental pears.

The Best Defense

What can homeowners and landowners do to help? Consider diversifying the next time you plant a tree and

avoiding ornamental pears or any other non-native trees with invasive tendencies. Secondly, prune off any sprouts that grow from the base of your ornamental pears to prevent crossbreeding with the sprouts and tree itself. Lastly, if you have ornamental pears consider replacing them with a different kind of tree once the pears decline or are damaged.

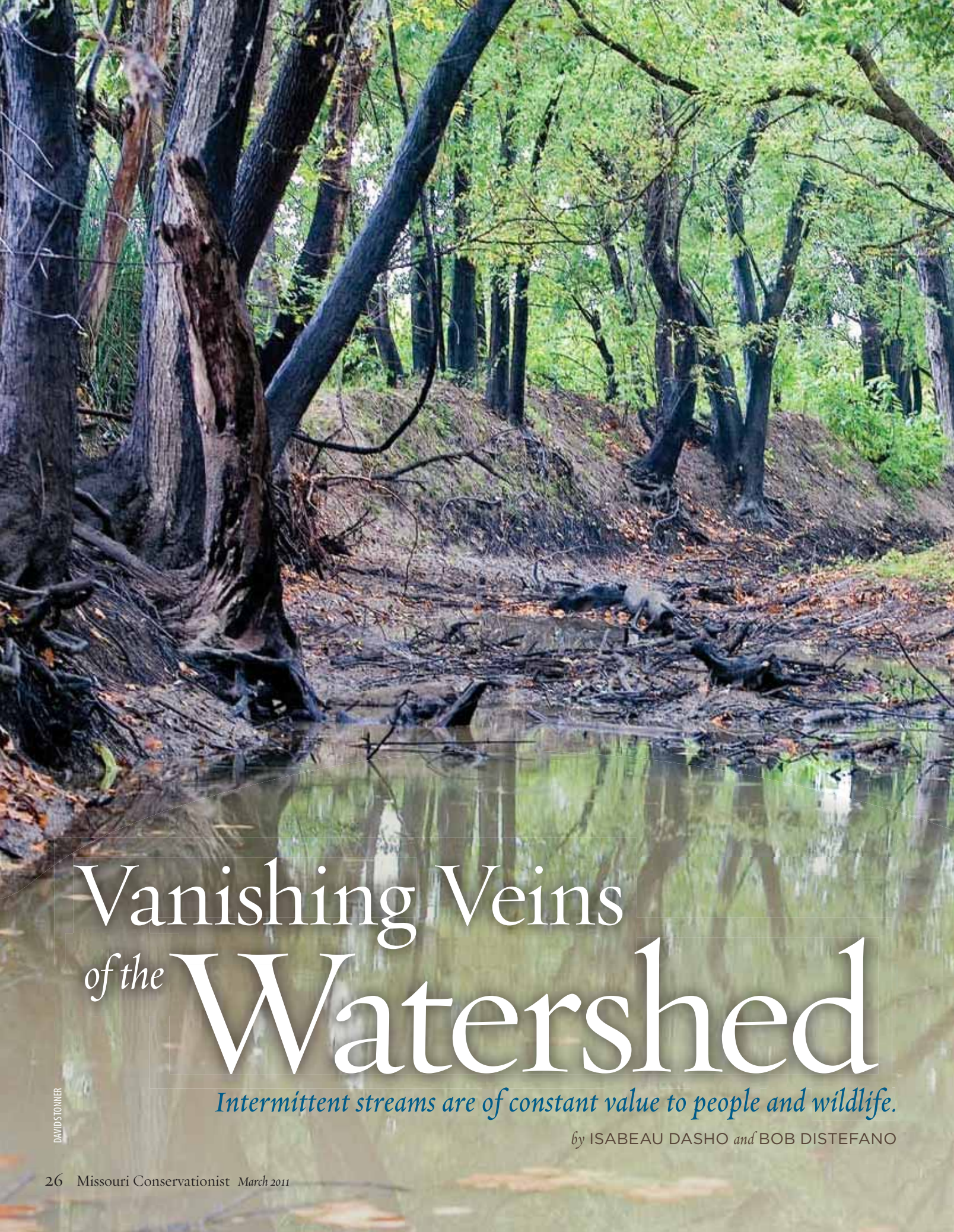
There are several interesting choices of native, small to medium flowering trees, such as downy serviceberry, yellowwood, redbud and hornbeam. A great reference when trying to select trees to plant in your yard or town is the publication *Missouri Urban Trees*. This full-color booklet with photos is free and available at Missouri Department of Conservation offices. You can also view it online at www.mdc.mo.gov/node/8045. Anne McKinstry, with the Missouri Nursery and Landscape Association, also suggests contacting your local, independent garden center. You can use their expertise to find the right tree for your situation and head off future problems.

If you spot wild callery pears on your property, control them by cutting them down and immediately treating the stumps with appropriate systemic herbicide to prevent them from re-sprouting.

It is yet to be seen how much damage wild callery pears will cause. Certainly there are fields that are already inundated with them. However, due in large part to the proactive efforts of citizens, we are learning about this problem fairly early.

So, keep your eyes peeled for wild callery pears and remember ... STOP THE SPREAD! ▲

Special thanks to Brett O'Brien, Natural Resources Supervisor with Columbia's Parks and Recreation Department, for collaboration on this article.



Vanishing Veins of the Watershed

Intermittent streams are of constant value to people and wildlife.

by ISABEAU DASHO and BOB DISTEFANO

DAVID STONER



Salt Creek River in Howard County is just one example of an intermittent stream.



DAVID STONNER

If most Missouri streams were in peril, would you notice? Fertile stream floodplains were the first home to our settlers and rivers were our first highways of interstate commerce. Streams water our crops, provide our livestock and wildlife with ample vegetation, transport grain and fertilizer, and give us clean water for drinking and bathing. We seek out streams during hot summers to fish, float, swim and chase crawdads. Much of who we are and what we do depends upon clean and healthy streams. But many Missouri streams have been clogged with silt, poisoned by pollutants and overrun by development. Part of the problem is that many of us might not *know* a stream when we see one.

There are three main types of streams: perennial, intermittent and ephemeral. The differences between these can be vague because they reside on a continuum of connectedness, like veins in a body. These water bodies are all intricately related and affected by each other.

Perennial streams maintain flow throughout the year except during times of extreme drought. Perennial streams are what most people envision when they think of streams. But these make

Join Missouri Stream Team

The Stream Team program provides an opportunity for everyone to get involved in stream conservation. Stream Team goals are:

- » Education—Learn about Missouri's 110,000 miles of flowing water. Stream Team provides training and information to better understand our stream systems and the problems and opportunities they face.
- » Stewardship—Hands-on projects such as litter control, streambank stabilization, streamside tree planting, water quality monitoring and storm drain stenciling are all possibilities.
- » Advocacy—Those who have gained a firsthand knowledge of the problems, solutions and needs of Missouri's stream resources are best equipped to speak out on their behalf.

Stream Team membership is free to any interested citizen, family or organization. You may adopt any stream or river of your choice. We can suggest streams if you like, or connect you with other Teams in your area. To learn more about Missouri Stream Teams or to find a membership form, visit www.mostreamteam.org.

up only about one-third of all Missouri streams. At the other end of the stream spectrum from perennial are ephemeral streams. **Ephemeral streams** are wetted only in direct relation to the amount of rainfall received in the watershed—no rain, no flow. Intermittent streams fall somewhere between ephemeral and perennial in size, but certainly not in terms of importance. **Intermittent streams** have wet and dry seasons, flowing with water during the rainy spring and fall and drying to an underground trickle with occasional shrinking surface pools during summer. When flowing, they average only about 10 feet wide and 7 inches deep. But what intermittent streams lack in volume they make up for in value. In Missouri, intermittent streams far outnumber and are critical to the health of perennial streams.

Importance

Intermittent streams are full of life. Even when they appear dry their water is flowing beneath the surface, invisible to any casual observer. These streams are teeming with hundreds of species of insects, snails, mussels and other invertebrates—a vital food source for larger amphibians, reptiles, fish, birds and mammals. Intermittent streams support large and diverse food webs throughout the year. They provide critical spawning and nursery sites for many species of commercially, recreationally and ecologically important fish. Their surrounding trees and vegetation often provide the only habitat for many important wildlife species, particularly in agricultural landscapes.

Intermittent stream residents are often specialists, having developed adaptations that allow them to fill unique niches within their ecosystem. Recent Conservation Department research found 36 kinds of invertebrates that occurred only in intermittent streams in our state. These little critters are adapted to the wet/dry cycle and cannot live in either perennial or ephemeral streams. For example, the eggs of some stoneflies sometimes remain dormant for several years until streams are rewetted. Some caddisflies have drought-resistant pupal cases.

Other organisms have also developed wet/drought life cycles. Missouri salamanders often prefer intermittent streams to perennial streams, burrowing into wetted stream bottoms when

Don't Dump Bait or Release Captives

Dumping the contents of your bait bucket or aquarium into Missouri's waters could introduce a species that might cause irreversible damage to our aquatic resources.

Some of Missouri's most severe problems with aquatic invaders are the result of species that have been transported only a few miles from one stream to another. Bait bucket introductions occur when anglers dump live bait into a water body from which that bait did not originate. Alternatives to dumping bait include:

- » Taking your bait home to use on a future fishing trip,
- » Offering it to another angler to use,
- » Dumping it on land far away from any waterway or
- » Placing it in a sealed container in the trash.

If a person feels they can no longer care for a captive animal kept in a private aquarium or pond, we recommend the following alternatives to releasing them into the wild:

- » Talk to a pet store owner or a hobby aquarium society (www.missouriaquariumsociety.org). They may be able to help find a home for your pet.
- » Give the fish or other animals to others who might wish to care for them.
- » Dispose of the animals in a sealed container. Your veterinarian may be able to help if you feel that euthanizing the animals is the most appropriate solution.

Missouri prohibits importing, exporting or releasing fish, amphibians, reptiles, mammals or any other form of wildlife unless specifically authorized by the *Wildlife Code*. Missouri's *Wildlife Code* also establishes a list of "Prohibited Species" that may not be possessed in Missouri. This list includes snakehead fish, walking catfish, rusty crayfish and several species of snails. For a complete list see 3 CSR 10-4.117 of the *Wildlife Code*.



the stream dries. Many Missouri fish species find intermittent streams an ideal habitat for a portion of their life cycles; minnows, shiners, darters, sculpins and madtom catfish species migrate to stagnant, isolated pools as streams dry and feed on the abundant insect life there. The Conservation Department recently found that 111 intermittent study streams contained 85

Even when they appear dry, as this creek bed shown above, intermittent streams are full of life.



Mammoth Spring crayfish

Some endangered and economically important species need intermittent streams for spawning and nursery sites, and many more species depend on these streams for critical stages in their life cycles.

different fish species, with an average of nine but up to 28 distinct species per stream. Common fishes included channel catfish, sunfish, black bass, goggle-eye, crappie and rainbow trout.

Some endangered and economically important species rely on intermittent streams for spawning and nursery sites, and many more species depend on these streams for critical stages in their life cycles. Missouri's rarest crayfish species, the Mammoth Spring crayfish, occurs in only three streams in the state, two of which are intermittent. Reptiles, birds and mammals use the vegetated corridors around intermittent streams and feed on the abundant life within them.

Intermittent streams are not only tremendous meeting places for swimming, crawling and



Mottled sculpin



Checkered madtom

flying wildlife to gather, but their other functions are equally vital to wildlife and people. Intermittent streams recycle important nutrients and energy that sustain the biological productivity of downstream rivers and lakes, keeping fish populations healthy and strong. These streams recharge surface and groundwater supplies for our drinking, bathing, irrigation and industrial uses. This water recycling keeps our river and lake water-clarity high, ideal for sport fishing and other recreation. Intermittent streams help control floods by slowing flows and providing floodplains for floodwaters to disperse and recede faster. So, these small streams also hold critical economic value to our society.

Threats

Human activities often threaten intermittent streams, possibly because it's easy to overlook their importance due to their small size and periodic dry conditions. However, scientific studies document that when intermittent streams are physically altered, their ability to perform the aforementioned services is often greatly diminished, even when engineers try to minimize impacts.

Improperly managed urban and suburban developments introduce silt and sediments through erosion, thereby choking these streams. Paving or lining them with concrete reduces

Inspect, Drain, Clean, Dry

Anglers play a critical role in preventing the spread of aquatic invasive species. Prevention provides the best short-term and long-term benefits to Missouri. Here are a few steps you can take to protect our waters.

- » Inspect your equipment, waders, boots, nets, boats, and trailers thoroughly and remove any trash, mussels or aquatic weeds before leaving any water body;
- » Drain water from buckets, sample jars, motors, live wells, bilge and transom wells, trailers and any other water from your boat and equipment before leaving any water body;
- » Clean everything with heated fresh water (like a car wash or pressure washer); and,
- » Dry everything thoroughly in the hot sun before using it again.

their ability to prevent downstream flooding. Row cropping or manure and fertilizer application too close to intermittent streams introduces harmful silt and toxic ammonia, killing stream life and tainting downstream water supplies for wildlife and people. Removal of vegetation surrounding intermittent streams will cause siltation, destroy feeding habitat and shelter for wildlife such as raccoon, quail and deer, and decrease or eliminate the recycling of nutrients for downstream fish and wildlife. Improper gravel mining, in or around intermittent streams, degrades the fragile stream bottom habitat that supports so much life and can alter stream dynamics. Industrial run-off, dumped or piped into intermittent streams, also degrades habitat and kills wildlife. Water extraction for industrial or municipal use may totally dewater intermittent streams at times of the year when lingering water is critical to aquatic life.

Without clean flows, fish will cease to spawn. Without insect larvae to eat, amphibians will starve and birds will move to other locations, just as larger predators will find their food stores low. The many niche species that have adapted to this unique environment are so dependent on and restricted to intermittent streams that they face localized extinction when these streams are degraded. Intermittent streams are adaptable, but a combination of too many of these harmful practices can irreversibly damage their biodiversity.

Intermittent streams are crucial to Missouri, and not only because of the unique and important biodiversity that lives in and around them. These streams provide dozens of ecological services that benefit people, such as flood prevention and containment. They filter and store water that we use for drinking, bathing and recreation. They also hold water for agricultural irrigation and livestock. They provide water to the trees and vegetation that produce oxygen and sequester carbon dioxide, helping to combat harmful air pollution. Intermittent streams provide habitat for animals we love, and love to eat.

Streams have been Missouri's legacy since before Meriwether Lewis and William Clark plotted their way up the Missouri River. And intermittent streams make up more than half of all miles of Missouri streams. Though these streams may go unnoticed by many of us, they

Landowners Care for Our Streams

The Conservation Department works with landowners to sustain healthy streams. To help with stream conservation, here are few things landowners can do:

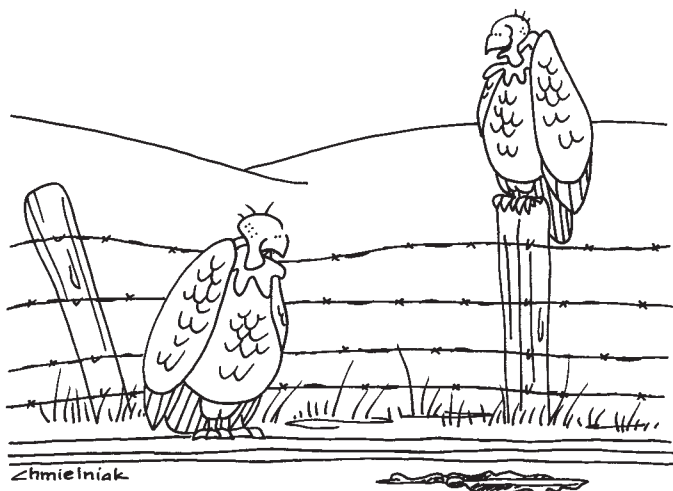
- » First and always, protect stream banks and riparian corridors for both rural and urban streams. Maintaining dense and permanent vegetation (trees when possible and appropriate) is vital to the safeguarding of these streams.
- » Keep livestock from streams and eroding banks. Consider alternative watering sources, and use rotational grazing practices. To learn more, visit www.mdc.mo.gov/node/5182 or contact your regional Conservation Department office (see Page 3 for phone numbers).
- » Minimize field runoff by maintaining or restoring native vegetation along streams, using well-designed stream crossings, and maintaining septic systems.
- » Do not drive ATVs directly into stream channels.
- » Limit the use of pesticides and herbicides around homes that border streams.
- » Harvest stream corridor trees with the advice of a forester.
- » Support and participate in programs aimed at protecting stream corridors. Examples include the Natural Resource Conservation Service's Conservation Reserve Program and the Stream Team Program.

These are some of the ways we can all become involved in protecting our valuable Missouri Streams. To learn more about stream management, visit www.mdc.mo.gov/node/2685 or contact your regional Conservation Department office (see Page 3 for phone numbers).



An intermittent stream recycles water, which keeps our river and lake water-clarity high, ideal for sport fishing and other recreation.

are critical to the health of the downstream waters that we all appreciate and use. As long as we plan on continuing our weekend fishing and float trips, and our daily consumption of clean water, we need to conserve our smallest streams and maintain the balance of our natural world. ▲



"Give it a break, Ray. You know a watched sparrow never spoils."

Hunting and Fishing Calendar

FISHING

	OPEN	CLOSE
Paddlefish	3/15/11	4/30/11

HUNTING

	OPEN	CLOSE
Coyotes	5/10/10	3/31/11
Crow	11/01/10	3/03/11
Deer		
Firearms: November	11/12/11	TBA
Turkey		
Youth	4/9/11	4/10/11
Spring	4/18/11	5/8/11
Waterfowl	please see the <i>Waterfowl Hunting Digest</i> or see www.MissouriConservation.org/7573	

TRAPPING

	OPEN	CLOSE
Beavers and Nutria	11/15/10	3/31/11

For complete information about seasons, limits, methods and restrictions, consult the *Wildlife Code* and the current summaries of *Missouri Hunting and Trapping Regulations* and *Missouri Fishing Regulations*, the *Fall Deer and Turkey Hunting Regulations and Information*, the *Waterfowl Hunting Digest* and the *Migratory Bird Hunting Digest*. For more information visit www.MissouriConservation.org/8707 or permit vendors.

The Department of Conservation's computerized point-of-sale system allows you to purchase or replace your permits through local vendors or by phone. The toll-free number is 800-392-4115. Allow 10 days for delivery of telephone purchases. To purchase permits online go to www.wildlifelicence.com/mo/.

Contributors

ISABEAU DASHO graduated from Stephens College with her B.F.A. in Creative Writing in May 2009. Her passion for environmental writing was awakened by two memorable summer internships with the Conservation Department. She plans to continue writing and engaging in public outreach with a focus on conservation.



CAROL DAVIT is the director of communications and development for the Missouri Prairie Foundation and the editor of the *Missouri Prairie Journal*. She enjoys writing about the natural world and exploring Missouri's natural communities with her family.

BOB DISTEFANO, a resource scientist for the Department since 1986, researches stream life and coordinates crayfish conservation and management. He enjoys working with students, making his tolerant wife and kids happy, laughing at life, and chasing other animals through woods and streams and eating them.



PAUL HAGEY, who lived in the Missouri Ozarks for a year after receiving his M.A. in journalism from the University of Missouri, is a natural history writer. He has a passion for illustrating the interconnectedness of life via the natural world in the articles he writes, and he looks forward to managing his own land someday.

ANN KOENIG has worked as a forester for the Conservation Department for 14 years and is a Certified Arborist. On the side, Ann enjoys tree climbing and has competed four times in an international tree climbing competition for arborists. Ann and her family live in Columbia and love Missouri's great outdoors.



Join us on Facebook

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Facebook is another great way to get information about nature and outdoor recreation in Missouri.

WHAT IS IT?

Spotted salamander

On the back cover and right is a spotted salamander by Jim Rathert. They are common throughout the southern two-thirds of the state, except the eastern part of the Bootheel. In the first warm rains in late February to mid-March, they gather to breed in shallow, fishless woodland ponds. The salamanders, sometimes numbering in the hundreds, engage in a sort of mating dance in shallow water. They are often seen crossing roads on warm, rainy nights in spring. To learn more, visit www.mdc.mo.gov/node/3930.



AGENT NOTES

Morel madness does not authorize trespass

WITH SPRING AROUND the corner, my taste buds are watering for Missouri's magnificent morel mushrooms. When I was a child, mushroom hunting was a fun springtime activity for my family. Now, I take my children mushroom hunting and make sure they know all the tricks to finding mushrooms, although many times we still come home with empty bags.

Once the first warm days of spring hit, many people

start looking for morels. While a small stand of timber or fence row may look tempting to check for mushrooms, doing so without permission is against the law. Conservation Agents receive several calls from landowners each spring regarding an unauthorized person, or persons, present on their land. Often these individuals believe they are harmlessly hunting morels, but by not obtaining permission, they have committed the crime of trespass. According to the *Revised Statutes of Missouri*, a person commits the offense of trespass when they enter unlawfully upon real property of another. Simply stated, trespassing is the act of being present on private land without permission from the landowner.

Spring morel hunting is a fun family activity, but you should always remember to get permission before entering property that does not belong to you. If a landowner does not give you permission, thank him/her and respect their decision. If you do receive permission from the landowner, offer to share what you find.



Matt Bergfield is the conservation agent for Macon County. If you would like to contact the agent for your county, phone your regional Conservation office listed on Page 3.

WHAT IS IT?

Our photographers have been busy exploring the intricacies of the Missouri outdoors. See if you can guess this month's natural wonder. The answer is revealed on the inside of this back cover.



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